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# The Contribution of a Community Event to Expert Work: an Activity Theoretical Perspective

## Abstract

*Becoming an expert in any knowledge domain takes time and a great deal of learning, both theoretical and experiential. The individual's knowledge is often supplemented through knowledge exchanges with other experts. Such exchanges are facilitated by events such as conferences or meetings. For two years we have been investigating the high profile work of scientists who work in the accredited anti-doping laboratories that are located in various countries around the world. These scientists work to curb doping in sport by conducting urinary analyses which detect athletes' use of performance enhancing substances. These international experts, in the field of anti-doping science, work in a complex socio-technical context comprising both scientific and general anti-doping practitioners such as the staff of anti-doping agencies, sporting federations, sports physicians, coaches, athletes and the media.*

*In order to maintain the high level of expertise necessary for this work, anti-doping scientists continuously search for and integrate new knowledge into everyday laboratory practice. To facilitate this process anti-doping scientists have developed working relationships and networks with other scientists working in the area. A major enabler of this process is the annual Manfred Donike Workshop on Dope Analysis. This paper describes the contribution of this event to the work of these expert scientists from an Activity Theory perspective.*

*Keywords: expansive learning, knowledge mobilisation, co-configuration, complex socio-technical systems*

## Introduction

To become a professional, individuals undertake a multi-faceted personal journey that includes the development of expertise in a particular area. However, becoming an expert in a chosen profession adds further dimensions to this journey, as the individual develops the ability to work at the cutting edge of their profession. As an expert professional, an individual will contribute new knowledge to their field, they will interact with other members of their profession, address problems which the profession faces and represent the shared views of the profession to those affected by its work including policy makers and society at large.

Whilst globalization has led to the expansion of workplace boundaries for many professionals, it has also led to international cooperation as a means of tackling public issues that are of universal concern. Some of these global public issues require scientific expertise if they are to be resolved. The scientific experts, who become involved in such non-profit global issues, find themselves working in a context where they interact regularly with scientists and non-scientists from various organisations at both national and international levels as they

grapple with the challenges of their chosen field. These globally dispersed settings where expert professionals interrelate with multiple organisations present a theoretically interesting research space.

Our paper describes the history and our observations of the annual Manfred Donike Workshop on Dope Analysis (hereafter referred to as the Workshop). It then examines the contribution of the Workshop to the scientific work using Activity Theory before drawing conclusions about the nature of the Workshop outcomes

## The research context

### *A complex problem of global social significance*

Sport is a high-profile international activity. Millions of people around the world take an interest in sport. Youth are encouraged to participate in sport and to admire elite athletes, who take on heroic stature. Elite athletes earn worldwide recognition, command large incomes and attract international media attention. As previously reported by the authors (Kazlauskas & Crawford, 2003a, 2003b), for many years, athletes have used both fair and foul means to enhance their performance in order to achieve such international status and rewards. Steroid use by the 100 metre sprint gold medallist, Ben Johnson, at the 1988 Olympic Games attracted global attention on the issue of doping in sport.

Doping scandals during the 1990s led to the recognition of doping in sport as a culturally embedded problem, one which was eventually perceived as requiring continuous, consistent, global efforts both scientifically and non-scientifically. Sporting organisations and governments spoke out strongly against the use of drugs to enhance athletic performance which they regarded as cheating, as deleterious to the athlete's health and as against the spirit of sport. Sporting organisations developed rules which banned doping by athletes and set out sanctions against athletes who used drugs to enhance their performance.

Individual nations responded by setting up laboratories which sought international accreditation from the International Olympic Committee (IOC) to carry out doping control analyses. Over the years, the number of laboratories increased from five in 1983 (Catlin, Hatton, & Starcevic, 1997) to thirty three in 2005 (see Table 1) accompanied by a growth in the number of scientists working in the area. Some of the countries listed in the table also have national anti-doping agencies whose role is to supervise the educational and non-scientific aspects of the national doping program such as sample collection and test results management.

By 2003, stakeholders in the work of anti-doping scientists included international and national anti-doping agencies, national and international sporting organisations, athletes and coaches, sports physicians and sports lawyers, other scientists working in related areas, the media and the general public. Interview data indicates that the stakeholders expect that the accredited doping control laboratory system will have the technical ability to identify athletes who enhance their performance in unacceptable ways, it will reliably produce accurate results which are defendable in a court of law; it will provide intelligence about new drugs being used by athletes to enhance their performance and it will use scientific knowledge in accordance with the ethics of anti-doping work as well as the accepted ethics of scientific behaviour. Thus the nature the work of scientists who work in accredited anti-doping laboratories is a mixture of different types of scientific work: regulatory, forensic, and research – both applied and pure. Further, anti-doping science is constantly evolving in order to keep up with a changing array of approaches to doping by athletes. Finally the ways in which the

work is carried out is subject to public scrutiny in terms of ethical conduct.

**An emerging global response**

Towards the end of the 1990s, national governments, international sporting organisations and the IOC discussed the global issue of doping in sport with a view to taking global action. These discussions led to the formation of the World Anti-Doping Agency (WADA). WADA commenced operation in January 2001 and as we have stated previously (Kazlauskas & Crawford, 2003a), WADA has been the beneficiary of substantial financial support, a functioning laboratory accreditation system of thirty or so laboratories situated around the world as well as intellectual property built up over the International Olympic Committee's more than twenty years of wrestling with the issue of drugs in sport.

Since its commencement, WADA has built upon the efforts of the IOC and addressed both scientific and non-scientific aspects of the doping problem in sport internationally through offices in North America, Asia, Africa and Europe. It is responsible for the continued development of the list of substances and practices which athletes are not allowed to use and it also oversees dope control testing at major sporting competitions around the world on a continuing basis. In January, 2004, WADA assumed regulative authority for anti-doping measures internationally and took control of the accreditation of doping control laboratories. An annual accreditation process was replaced by quarterly proficiency testing. Under WADA, those laboratories which do not provide results which are 100% accurate and in line with ISO17025 guidelines are required to explain their results and describe the corrective actions they have taken to improve the quality of their work. Laboratories which are not able to consistently meet these requirements are suspended until they are able to comply with WADA's standards.

Thus, the context within which the scientific

**Table 1: Locations of WADA accredited doping control laboratories (www.wada-ama.org, January, 2005)**

| Asia & Oceania | Americas | Africa |
|---|---|---|
| Bangkok, Thailand | Bogotar, Columbia | Bloemfontein, South Africa |
| Beijing, China | Havana, Cuba | Tunis, Tunisia |
| Penang, Malaysia | Los Angeles, U.S.A. | |
| Seoul, Korea | Montreal, Canada | |
| Sydney, Australia | Rio de Janeiro, Brazil | |
| Tokyo, Japan | | |
| **Europe** | | |
| Ankara, Turkey | Kreischa, Germany | Oslo, Norway |
| Athens, Greece | Lausanne, Switzerland | Paris, France |
| Barcelona, Spain | Lisbon, Portugal | Warsaw, Poland |
| Cologne, Germany | London, Great Britain | Prague, Czech Republic |
| Ghent, Belgium | Madrid, Spain | Rome, Italy |
| Helsinki, Finland | Moscow, Russia | Seibersdorf, Austria |
| | Newmarket, Great Britain. | Stockholm. Sweden |

directors of accredited antidoping laboratories work is like all other complex socio-technical activities in that it has evolved over a period of time, often in response to perceived needs or events that have had a high impact. The high profile, social orientation, complex, pressurised and changing nature of this context make it particularly interesting for our research into the dynamics of scientific work in the public sector. Interview data has indicated that the scientific directors regard the Cologne Workshop as a major means by which they maintain and expand the expertise of both themselves and their staff. This paper examines of the contribution of this annual community event to the work of anti-doping scientists.

## An annual community event: the cologne workshop on dope analysis

The following two sections of this paper provide a brief description of the Workshop history and activities as observed and as elicited from discussions with participants.

### Cultural Historical Account of the Cologne Workshop on Dope Analysis

Professor Manfred Donike, one of the pioneers in antidoping science and a former athlete, organized the first of the annual week-long Workshops at the German Sports University in Cologne in February, 1983. The eighteen attendees from eleven European countries and the U.S.A. came to the Workshop to learn about the recent application of analytical chemistry to the detection of performance enhancing drugs in human urine through morning lectures, afternoon practical sessions and evening social outings.

Over the years, the body of scientific knowledge and its application to anti-doping science has expanded and the number of scientists working in the area has grown. In 2004, there were more than one hundred and twenty attendees at the Workshop and like all complex activity systems in which people learn and grow, the format for the Workshop exhibits signs of expansive reconfiguration (Engeström, 1990) as a result of the response to the changing needs of the attendees. In the 1980's the focus was on laboratory-based development of practical skills by attendees. The current format places a greater emphasis on presentations, either talks in the lecture theatre or posters displayed in the corridor which runs from the lecture theatre to the coffee break area. Both talks and posters disseminate the outcomes of recent scientific research. Lengthy coffee and lunch breaks ensure that participants have time to discuss the research outcomes with the researchers and with each other. The daily practical sessions in the laboratory have been replaced by an extended visit to the doping control laboratory in Cologne on the final morning of the Workshop.

The Workshop acknowledges and nurtures the achievements of new scientists. Many of the scientific talks and posters are presented by younger scientists from accredited laboratories. In the final session of the Workshop, Marie Theres Donike, widow of the late Professor Manfred Donike, presents an award to the young scientist whose contribution at the Workshop has been the most outstanding.

The publication process for the proceedings of the Workshop has evolved in response to the need to share research outcomes within the community at the earliest possible time without compromising the needs of researchers to publish in more prestigious journals. Since 1993, an editorial committee has overseen the publication of the refereed proceedings of the Workshop as 'Recent Advances in Doping Analysis'. A few months after the Workshop, presenters are invited to submit the paper associated with their talk or poster. The reviewed papers are published and given to attendees at the Workshop the following year.

The Workshop is the major opportunity for the scientific directors of the laboratories to be together in the same place for a reasonable length of time and so to engage in the informal discussions that facilitate working relationships between directors and laboratories. The Workshop is the occasion when the World Association of Anti-Doping Scientists (WAADS) holds its annual general meeting. This organisation, formed in early 2001, provides anti-doping scientists with a forum in which to discuss important issues. As a group, WAADS is committed to high scientific and ethical standards within anti-doping scientific work.

The Workshop also connects scientists with government and stakeholder groups. It is officially opened by representatives of the German Government's Sports Ministry and the German Sports University's administration. There is also a session in which the media are able to ask the scientists questions about doping issues.

**Observations of the 2003 and 2004 Cologne Workshops on Dope Analysis**

In 2004, Workshop attendees came from around forty different countries. Ninety six attendees came from thirty two of the thirty three laboratories by WADA in January 2005. Twenty three of the thirty three 2005 accredited scientific directors attended the Workshop. Of the remaining ten accredited laboratories, nine sent one or more staff to the Workshop. Only one accredited laboratory did not participate in the 2004 Workshop. There were around nine non-laboratory participants from anti-doping agencies and commercial organisations which supply instrumentation or other resources for doping control. The remaining attendees were from either non-accredited anti-doping laboratories whose work is in harmony with the ethics of the accredited doping control laboratory system, or from countries which are in the process of setting up an accredited laboratory.

The scientific content of the Workshops were wide-ranging and substantial and fostered ideas for further research in anti-doping science. Four workshop sessions were held daily from Monday through Thursday. Each session had three or four talks on a theme and was chaired by either a scientific director from one of the accredited laboratories or by another well-known Workshop participant. Few scientific directors gave talks in 2003 or 2004 – only five scientific directors gave talks at the 2004 Workshop and the majority of these directors came from outside Europe. The contribution of the scientific directors was more obvious during the question time after each talk when they offered comments about work in related areas or shared other information relevant for the speaker and other attendees. Sometimes comments became a discussion about the science or the policies of doping control. Such discussions were often extended over a meal or cup of coffee. The evening social events, ensure that participants have the opportunity to continue to talk with each other, to share ideas, to form working relationships and to build a shared vision of the community's practice of anti-doping science.

It is our observation that the atmosphere of this annual gathering affirms and supports the highly pressurised work of these antidoping scientists. However, the term "family" was used by two different scientists to refer to the atmosphere of this annual gathering. External participants who attended the Workshop commented on the relaxed, friendly, collaborative atmosphere of the group. One stated that this was not expected from comments made by other stakeholders about anti-doping scientists. After the conclusion of the 2004 Workshop one director said that he had enjoyed the Workshop immensely and that he was leaving with many questions which he would attempt to answer with further research. Another commented that his laboratory's staff knew that he would return with many new

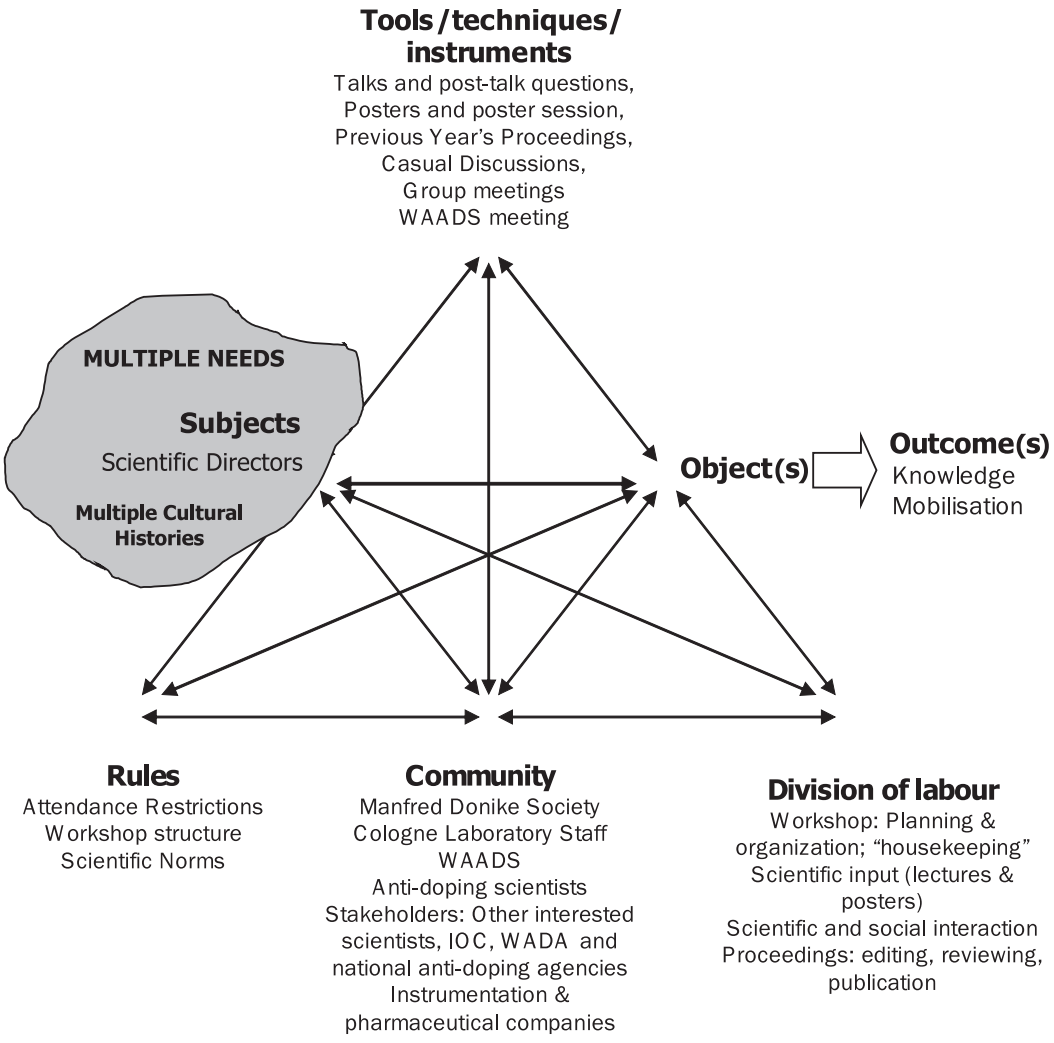


**Figure 1: The Cologne Workshop on Dope Analysis as a Tool**

ideas which they would explore over the next twelve months. In this way the Workshop has provided "a platform for advancing individual and/or collective knowledge" (Nonaka & Konno, 1998, p. 40) through a need to learn "what is not yet there" (Y. Engeström, 1991, p. 270).

## The cologne workshop: a context for activity

Drawing on the cultural-historical theory of activity first proposed by Vygotsky (1978) and further develop by Leont'ev (1978; 1981) and extended and applied by Engeström (1987;

1991; 2000), we have used Activity Theory to examine the annual Workshop as a context for the Activity of antidoping scientific work. The Workshop provides the directors and other anti-doping scientists with a regular opportunity to grapple individually and communally with issues that relate to their work and in particular to view and discuss a large number of presentations about the results of recent research relevant to their field. They attend the Workshop because they wish to expand antidoping scientific practice through ensuring that their knowledge is current and that they are able to successfully integrate new knowledge into laboratory practice.

We now present our analysis of this Activity, beginning with a description of the multiple cultural historical backgrounds of the scientific directors as subjects of this Activity System. A diagrammatic representation of the context in Activity Theory terms is given in Figure 1.

**Diverse Cultural Histories and Experiences of Subjects**

The scientific directors are a diverse group of people with diverse cultural histories. An examination of the list of 2005 WADA accredited laboratories and the statistics for 2003 doping analyses worldwide gives an indication of the group's diversity (see Table 2). The laboratories are situated in a variety of contexts which impact upon the nature of their work. Most are situated in universities or university hospitals and thus have academic work to do as well as their laboratory work. Many others are part of a government department or organisation. Only a few laboratories are fully commercial. There is also variation in the formal qualifications and gender. Some laboratories are located in countries which also have established an anti-doping agency and thus the directors liaise with general antidoping practitioners regarding the conduct of the national antidoping program. The remaining laboratories often employ the only personnel knowledgeable about anti-doping matters in their countries.

As can be seen from the Table 2, the directors come from all regions of the world, and thus have various cultural historical backgrounds. The majority of the directors are European. English is the accepted language for communication as it is the language of science, but it is the day-to-day language of only four of the directors. Interview data suggests that some directors would like to be able to have in depth discussions of their work in their mother tongue; others were concerned that they were unable to represent themselves or their ideas adequately in English.

The work of the laboratories also varies. According to WADA's 2003 statistics of doping analyses conducted by the accredited laboratories, 10 laboratories analysed on average more than 115 samples per week. Higher numbers of analyses are associated with a greater number of staff for the scientific director to supervise. With high numbers of samples to analyse, a laboratory is more likely to have to process a positive analytical result. Positive analyses are often associated with follow up testing and preparation of documentation which will enable the legal defence of the results of such analyses, all of which take considerable effort and expertise. Nine laboratories conducted fewer than 50 analyses per week with a corresponding decrease in the number of staff working and less intense involvement in both scientific and non-scientific doping control activities. Smaller laboratories frequently engage in diverse activities. Interview data suggests that, in the absence of sufficient income from doping control work, some laboratories have undertaken other types of work in order to maintain financial viability.

Cultural histories are also shaped by the diverse pathways by which the directors came to this Activity and the length of their involvement in the field. Interview data suggests that the directors' initial areas of expertise range

**Table 2: Diversity of the Cultural Histories of the Scientific Directors**

| **Laboratory Context** | | | | | |
|---|---|---|---|---|---|
| University | **14** (43%) | Government | **11** (33%) | Commercial | **3** (9%) |
| University/ Hospital | **1** (9%) | Hospital | **1** (3%) | Government/Commercial | **1** (3%) |
| **Director Qualifications** | | | | | |
| Doctorate | **16** (49%) | Professoriate | **14** (42%) | Other | **3** (9%) |

| **Gender** | | **Country has an anti-doping agency** | |
|---|---|---|---|
| Male | **28** (85%) | Yes | **19** (58%) |
| Female | **5** (15%) | No | **14** (42%) |

| **Geographical Location** | | **Number of Samples Analysed in 2003** | |
|---|---|---|---|
| Europe | **20** (61%) | Under 2500 | **10** (32%) |
| Asia & Oceania | **6** (18%) | 2500 to 6000 | **12** (39%) |
| The Americas | **5** (15%) | | |
| Africa | **2** (6%) | Above 6000 | **9** (29%) |

across various combinations of chemical, biological and medical sciences. Some directors sought to establish a laboratory because they felt that their scientific expertise would enable them to make a contribution to the prevention of drug abuse by athletes, others were employed because of their country's intention to host a major international sporting event which required doping control. Some scientific directors have been in the role for just a few months whilst others have been involved in anti-doping science since the first application of analytical chemistry to doping control more than thirty years ago.

The various attributes of the individual directors and their laboratories highlight the fact that each scientific director has a unique cultural history. Whilst these unique histories give rise to a variety of needs, there are shared understandings which result in shared needs. For example, all directors have a need to maintain the quality of their laboratory in order to regularly demonstrate the proficiency of their laboratory to WADA and to ISO accreditation bodies; all have a need to expand their knowledge of the application of science to the detection of doping agents by athletes.

**Tools/ techniques/instruments used in the Workshop Activity**

In Activity Theory terms, the Cologne Workshop provides a variety of instruments that assist the scientific directors as they grapple with the object(s) of their activity. The refereed proceedings of the previous year's Workshop, bearing the title 'Recent Advances in Doping Analysis (#)', provide attendees with the only annual publication which provides a collation of scientific work in the area together with references to other recent relevant publications for anti-doping scientists. Workshop presentations disseminate recent research outcomes about the improvement of current methodologies, the development of new analytical techniques and work on areas of concern for the future, such as gene therapy. Questions and answers facilitate the

emergence of a deeper understanding of the research, possible refinements or extensions to the research, related policy concerns and/or the relevance of the research to the routine work of the anti-doping laboratory. Informal conversations facilitate valuable sharing of stories about particular positive cases, the functioning of various instruments and analytical approaches, other research that has not been presented formally at the Workshop, and the impact of anti-doping policy on the laboratories. Overall, these conversations provide a socially oriented context which facilitates learning both individually and collectively as well as the identity formation for newcomers to anti-doping science. The WAADS annual general meeting facilitates a more formal discussion of the policy issues which relate to anti-doping laboratories and also about the outcomes of the WAADS quality assurance program which supports the conduct of quality work by the laboratories.

**Constituents of the Community**

The Community which mediates the sharing of experiences, ideas and awarenesses (consciousnesses) at the Workshop is comprised of the Workshop organisers, namely the Manfred Donike Society, involved staff of the Institut für Biochemie and German Sports University in Cologne, scientists from accredited anti-doping laboratories and other scientists who hope to establish an anti-doping laboratory or conduct other relevant research, instrumentation manufacturers, general anti-doping practitioners in agencies such as WADA, politicians and the media.

**Division of Labour: Who does what**

A feature of this workshop is the ways in which the participants of the community share responsibility for and carry out various tasks which contribute to the collegiality of the experience which supports the exchange of knowledge and values. The scientific and social program organisation and "housekeeping" tasks during the Workshop are carried out by members of the Manfred Donike Society, including Mrs Donike, and the staff of the German Sports University. Acceptance of applications to attend and Workshop presentations is undertaken by a member of the Manfred Donike Society who is also a senior member of the staff of the Cologne Doping Control Laboratory. The scientific presentations are given by some of the Workshop attendees. All Workshop participants contribute to varying degrees to the general discussion during the Workshop that supports the peer review, networking and identity formation processes. The Workshop proceedings are prepared and submitted by presenters, reviewed by a number of experienced anti-doping scientists and edited by a small number of staff in the Institut für Biochemie.

**Rules: Attendance and Contributions**

Rules relating to Workshop attendance and contributions support the Workshop's goal: to ensure that anti-doping scientists are kept informed of the recent advances in their area. Thus the workshop aims to accommodate the increasing numbers of anti-doping scientists who wish to attend. The Workshop venues at the German Sports University restrict the number of attendees at the Workshop. With the need to give priority to staff from the growing number of accredited laboratories at the Workshop, the attendance of personnel from other institutions at the 2005 Workshop has been limited to a single representative. Attendees at the Workshop are expected to work towards controlling the abuse of drugs by athletes and so uphold the ethics of the anti-doping movement and of good science. In 2004, the representative of one commercial laboratory was not permitted to attend the Workshop as the activities of the laboratory were not in keeping with the code of ethics of the accredited laboratory system. Presentation submissions

are vetted by Workshop organisers to ensure that the Workshop program covers recent research outcomes in anti-doping science and other relevant issues.

**A Variety of Object(s)**

The diverse cultural histories of the subjects of this Activity system give rise to differing needs and to multiple objects. Survey and interview data has indicated that the directors' work is focused upon establishing and maintaining a laboratory of the required international standard to carry out doping control analyses; contributing to the development of knowledge in the area through carrying out relevant research; participating in local or international policy development. Scientific directors are also frequently committed to the professional development of a new generation of anti-doping scientists (Kazlauskas & Crawford, 2003a, 2004).

Many directors regard attendance at the annual Cologne Workshop as compulsory because it enables them to achieve to consolidate and extend their knowledge of anti-doping science. Other reasons for attending the workshop include: the dissemination to colleagues of their own laboratory's research outcomes and developments; the establishment and nurturing of relationships with others through the sharing of stories; conversations with their peers about scientific and policy issues that affect their work in doping control; the construction of a shared vision for the conduct of credible scientific practice in this area, and the experience of the supportive collegial atmosphere of the Workshop. The variety of these reasons align with the different objects of the directors and suggest that these objects are "constantly in transition and under construction, (taking) different forms for different participants … at different moments of the activity" (Hasu & Engeström, 2000, p. 64). Thus, these objects are transitory – "a moving horizon" (Y. Engeström, 2004, p. 6).

**Expansive Resolution of Tensions**

Over the years the Workshop organisers have had to resolve a number of tensions relating to the Workshop. This has resulted in multiple expansive reorganisations of the Workshop. The most obvious of these tensions have had to do with the growing number and increasing expertise of attendees and the Workshop structure. These tensions have been resolved by finding alternative larger venues for Workshop activities and the change from an intensive-classroom and practical "hands-on" approach to the current talks / posters / laboratory visit format. One interviewee described a tension that had existed between the Workshop organisers and researchers concerning the role of the Workshop as a forum for the dissemination of recent research outcomes for incorporation into anti-doping laboratory practice and university based scientific directors who viewed knowledge dissemination as being the function of publication in peer reviewed journals. The interviewee stated that this tension has been resolved through the publication of the Workshop proceedings twelve months after the Workshop at which the presentation was made. As a result of this year long timeline, the interviewee believes that presenters have sufficient time to publish their research in both a prestigious academic journal as well as make a presentation at the Workshop and so enable discussion of the research with colleagues. This approach is built upon an acceptance of the right of the "discoverer" of research to be acknowledged by others working in the area.

A more recent tension for the organisers of the Workshop as they endeavour to provide talks that will keep Workshop attendees well informed about relevant scientific developments in the anti-doping area has been the need to invite scientists who work in other fields such as genetics and protein chemistry to describe their research and discuss its relevance for anti-doping science at the Workshop.

**Workshop Outcome(s): Knowledge Mobilisation**

The Workshop provides an annual opportunity to engage in an expansive learning cycle (Y. Engeström, 2000) which leads to laboratory improvement. During the Workshop, attendees acquire new knowledge and skills which they take back to their laboratories. They facilitate the growth of the knowledge and skills of their own staff, improve their own laboratory by transforming their new knowledge into laboratory practice and conduct further research whose outcomes they present at future Workshops. The accumulation of the improvements in individual accredited laboratories contributes to the advancement of the accredited laboratory system. Hasan and Crawford coin the term 'knowledge mobilisation' to describe the process of "actively mobilising knowledge to improve performance through collective learning for innovation" (2004, p. 1). We believe that the outcome of the Activity engaged in by attendees at this annual Workshop is one example of knowledge mobilisation.

## Knowledge mobilisation, expansive learning and co-configuration work

The work of knowledge mobilisation, such as that achieved by the anti-doping scientific community through the Cologne Workshop on Dope Analysis, can also be regarded as co-configuration work. Hasu and Engeström (2000) have discussed the innovation process and the concept of co-configuration work which occurs during the transitional phase when a new product is transferred from developers to users.

Engeström (2004) asserts that expansive learning "provides a central framework for the analysis and design of learning processes in co-configuration settings" (p. 4). Engeström describes the three central features of expansive learning in co-configuration work as:

- transformative: it "broadens the shared objects of work by means of explicitly objectified and articulated novel tools, models and concepts" (p. 5).
- horizontal: it "creates knowledge and transforms the activity by crossing boundaries and tying knots between activity systems operative in divided multi-organization terrains" thus forming linkages between producers and users (p. 5).
- subterranean: it "blazes embodied and lived but unnoticeable cognitive trails that serve as anchors and stabilizing networks that secure the viability and sustainability of the new concepts, models and tools" (p. 5).

Engeström (2004) states that successful co-configuration work "requires dialogical and reflective knowledge tools as well as new, collaboratively constructed functional rules and infrastructures" (p. 3) in order to interpret, negotiate and synthesize real-time feedback information.

At the collaboratively constructed Workshop, the innovation being transformed is a knowledge product, produced and used by anti-doping scientists. The Workshop activities of formal sessions and casual discussions supply the functional rules and infrastructures that encourage the dialogue and reflection. This dialogue provides speedy feedback from user to the producers that is then interpreted, negotiated and synthesised throughout this Workshop. The resulting co-configuration work of knowledge mobilisation transforms, links and stabilises research outcomes thus facilitating their integration into anti-doping laboratory practice.

## Conclusion

In this paper, we have used Activity Theory to develop a deeper understanding of the contribution of the annual Manfred Donike Workshop in Dope Analysis to the work of the scientific

directors of accredited anti-doping laboratories. The rich diversity of cultural histories of the directors has given rise to various needs which have resulted in multiple transitory objects. These objects have been and continue to be part of the expanding cycle of activities that has been a feature of the Workshop. As an annual event, the co-configuration work of knowledge mobilisation that is the outcome of the Workshop has ensured that the directors are better able to advance the work of the laboratories and their contribution to the global issue of doping control in sport.

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